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In re Patent Application of:

Gerold Heckert

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Kathryn L. Finder — Signature
November 7, 2001 — Date

Hon. Commissioner of Patent and Trademarks
Washington, DC 20231

STATMENT CONCERNING FILING OF SUBSTITUTE SPECIFICATION PURSUANT TO 37 CFR 1.125

Sir:

Applicant states that the attached substitute specification and abstract is filed in order to correct any faulty English that resulted from the translation of the originally filed German specification and abstract. Pursuant to 37 CFR 1.125, Applicant submits that acceptance of such substitute specification and abstract, which contain no new matter, would greatly facilitate processing of the application. The Examiner is respectfully requested to accept such substitute specification and abstract.

Respectfully submitted,

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Scissors Lifting table

The invention pertains to a scissors lifting table with a scissors unit located between a carrier device and a base unit, having two pairs of legs pivoting relative to each other about a scissors axis, and with a lifting device which features a lifting truck moving back and forth by means of a drive unit, for opening and closing of the scissors.

A scissors lifting table of this kind for raising and lowering loads, as is used, for example, in the manufacture of automobiles, is described in DE 90 05 566 U1. In this known scissors lifting table, a platform holding the load is raised or lowered by means of two scissors located laterally parallel to each other by opening and closing the scissors legs. Opening and closing the scissors is effected by means of a lifting skid or lifting truck which is moved back and forth between lateral, longitudinal struts of a base unit. The lifting truck features inclined lifting curves at its top side, which cooperate with rollers located in the vicinity of the scissors axis for raising and lowering the platform. The lifting skid is moved with a drive unit by means of a threaded spindle. A spindle of this kind is a precision part and usually runs on a ball bearing support in a spindle nut. This kind of spindle drive is relatively expensive and also is sensitive to transverse forces and vibrations, so that its operation is disturbed and the spindle drive can be damaged.

Some scissors lifting tables with hydraulic actuators are described in documents DE 44 13 527 A1 and in DE 83 29 409 U1. This kind of hydraulic actuator usually causes a jerky starting and stopping and can also cause undesirable, oily discharges.

The invention is based on the problem of preparing a scissors lifting table of the kind described above, so that a dependable, controlled lifting motion is achieved.

This problem is solved by the properties of Claim 1. Accordingly, this invention provides that a fixed-location drum parallel to the scissors axis can be driven with the drive unit so that at least one band-shaped traction means can be moved, said means being coupled to the lifting truck and arranged around said drum, that by means of a drive unit, the band-shaped traction means can be wound onto the drum to open the scissors by pulling the lifting truck in the direction of the scissors axis, and it can be unwound from the drum to close of the scissors by using the motive force of the lifting truck moving in the opposite direction, away from the scissors axis.

With these features, well-controlled starting and stopping of the raising and lowering movements can be achieved, and all with a sturdy and, at the same time, low-cost design. If at least two band-like traction means are used in parallel, then the operation can be temporarily continued even with a damaged traction means.

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One construction variant of the invention provides for the lifting truck to be located on the side of the scissors axis facing away from the drum, and another embodiment provides for the lifting truck to be located on the side of the scissors axis facing the drum, and the traction means is guided over a deflection roller.

The lifting motion can be affected in the desired manner in that the lifting truck is guided along lifting curves located at the lower leg sections of one pair of legs or along the upper leg sections of the other pair of legs, or along lifting curves located at the leg sections of both pairs of legs. For example, in this manner a constant lifting load can be achieved, while the tensile load in the band-shaped traction means remains constant in all hoist positions. To vary the motion sequences or load, it is also possible that the lifting curves be adjustable and/or replaceable.

Furthermore, additional favorable construction variants provide for the drum to be located on one lower, fixed pivot axis of one pair of legs, or is located outside of it. If the fixed pivot axis is used for the drum bearing, then additional bearing elements can be eliminated. On the other hand, a configuration outside of the pivot axis can be favorable for maintenance or for band control, under certain conditions.

Favorable drive control is achieved with the modification that the drive unit has a frequency-controlled electric motor, wherein both high lifting speeds and also very accurate lift positioning are attained.

For a controlled lowering and for safety reasons, it is favorable that the drive unit have a braking device for controlled lowering of the carrier.

Also contributing to safety is the fact that a catch device is provided to prevent uncontrolled lowering.

The invention will be explained in greater detail below based on one embodiment, with reference to the figure.

The figure presents a side view of a scissors lifting table with a platform or a carrier device for supporting a load. The carrier device has lateral supports 10, on which the upper ends of a first and second pair of legs 1, 2 are articulated. The left leg ends of the second pair of legs 2 are seated here against a fixed pivot axis, whereas the right leg ends of the first pair of legs 1 are seated upon and can slide in the supports 10 and also pivot on rollers or pins, as is already known. The lower leg ends are seated in lateral rails 11 of a base unit, and the left lower leg ends of the first pair of legs 1 are seated on a fixed pivot axis and the right lower leg ends of the second pair of legs 2 are pivotably mounted to the rail 11 or are seated on rollers. The two pairs of legs 1, 2 are attached to a scissors axle 6 and can pivot relative to each other.

To raise and lower the carrier device or to open and close the scissors formed by the two pairs of legs 1, 2, there is a lifting truck 3 located between the mutually facing sides of the first

and second pair of legs 1, 2; this truck can be displaced or moved, and between the edges of the pair of legs 1, 2 there are suitable lifting curves 8, 9, on which the lifting truck 3 is moved, that affect the movement of the hoisted load.

The lifting truck 3 is pulled toward the scissors axle 6 by means of one or several tension bands 4 located side by side for lifting the carrier device or for opening the scissors, and the tension band or bands 4 are wound up by means of a drum 5 located on the other side of the scissors axle 6 with respect to the lifting truck 3; this drum is connected to a drive unit 12. For lowering the carrier device or for closing of the scissors, the lifting truck 3 moves under the inherent load of the scissors lifting table away from the scissors axle 6, and the tension bands 4 are unwound from the drum 5. In this case, the drive unit 12 or its transmission can act as a braking device, or an additional braking device can be used.

Alternatively, the lifting truck 3 can be located on the same side, with respect to the scissors axle 6, as the drum 5 seated parallel to the scissors axle 6. In this case, a deflection roller is provided on the side of the scissors axle 6 opposite from the drum 5 or the lifting truck 3.

The drive unit 12 preferably has a frequency-controlled electromotor with which both high lifting speeds and also high-precision lifting positions can be attained. The start-up and motion sequences can be programmed by means of a corresponding control device, and in particular, also the initial phase and the end phase of the movements can be programmed for gentle starting and stopping.

The drum 5 can be seated on the fixed pivot axis 7, or it can be supported separately from it. In order to prevent an uncontrolled downward motion of the carrier device, a catch device can be used that will be activated by a fast downward motion.

Claims

1. Scissors lifting table with a scissors unit located between a carrier device (10) and a base unit (11), having two pairs of legs (1, 2) pivoting relative to each other about a scissors axis (6), and with a lifting device which features a lifting truck (3) moving back and forth by means of a drive unit (12) for opening and closing the scissors, characterized in that a fixed-location drum (5) parallel to the scissors axis (6) can be driven in with the drive unit (12) so that at least one band-shaped traction means (4) can be moved, said feature being coupled to the lifting truck (3) and arranged around said drum, that the band-shaped traction means (4) can be wound up on the drum (5) by means of a drive unit (12) to open the scissors by pulling the lifting truck (3) in the direction of the scissors axis (6), and it can be unwound from the drum (5) to close the scissors by using the motive force of the lifting truck (3) moving in the opposite direction away from the scissors axis (6).

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2. Scissors lifting table according to Claim 1, characterized in that the lifting truck (3) is located on the side of the scissors axis (6) facing away from the drum (5).

3. Scissors lifting table according to Claim 1, characterized in that the lifting truck (3) is located on the side of the scissors axis (6) facing the drum (5), and the traction means (4) is guided over a deflector roller.

4. Scissors lifting table according to one of the preceding claims, characterized in that the lifting truck (3) is guided along lifting curves (8, 9) located at the lower leg sections of one pair of legs (2) or along upper leg sections of the other pair of legs (1), or along lifting curves located at the leg sections of both pairs of legs (2, 1).

5. Scissors lifting table according to Claim 4, characterized in that the lifting curves (8, 9) are adjustable and/or replaceable.

6. Scissors lifting table according to one of the preceding claims, characterized in that the drum (5) is located on one lower, fixed pivot axis (7) of one pair of legs (1), or is located outside of it.

7. Scissors lifting table according to one of the preceding claims, characterized in that the drive unit (12) has a frequency-controlled electric motor.

8. Scissors lifting table according to one of the preceding claims, characterized in that the drive unit (12) has a braking device for controlled lowering of the carrier (10).

9. Scissors lifting table according to one of the preceding claims, characterized in that a catch device is provided to prevent an uncontrolled lowering.

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